PB81-109357

Record of Decision Northglenn Water Management Program City of Northglenn, Colorado

(U.S.) Environmental Protection Agency
Denver, CO

9 Sep 80

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Draft Environmental Impact Statement dated January 11, 1980 and Final Environmental Impact Statement dated June 27, 1980 issued by EPA.

16. ABSTRACT

This is a public record of decision regarding proposed construction of facilities to provide water supply, wastewater treatment and agriculture reuse of sewage effluent for the City of Northglenn, Colorado. Under an exchange agreement with the Farmers Reservoir and Irrigation Company, approximately 5,000 acre-feet of water will be diverted annually for Northglenn's municipal use, treated, augmented from other sources, stored, and then returned for irrigation purposes.

The U.S. Environmental Protection Agency (EPA), Region VIII, Denver, under the authority of Section 201 of the Federal Water Pollution Control Act Amendments of 1972, has authorized a grant for 75 and up to 85 percent matching funds for construction costs of the proposed wastewater treatment facilities.

The recommended action is to construct an 8 mile interceptor, aerated lagoon and a storage reservoir. Implementation of the exchange program negates the pending water condemnation actions that were in progress.

17. KEY WORDS AND DOCUMENT ANALYSIS

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Region 8
1860 Lincoln Street
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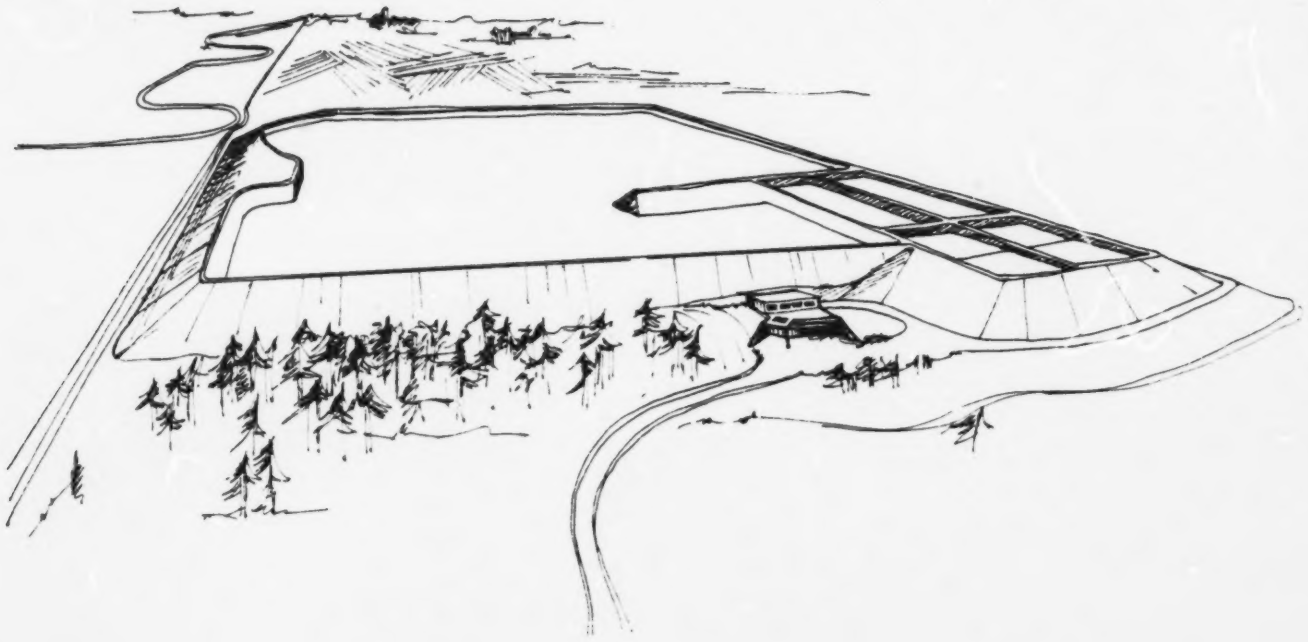
EPA Record of Decision



Northglenn Water Management Program
City of Northglenn, Colorado

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EPA - 908/5-79-002D

RECORD OF DECISION
NORTHGLENN WATER MANAGEMENT PROGRAM
CITY OF NORTHGLENN, COLORADO

Prepared by

U.S. Environmental Protection Agency
Region VIII
1860 Lincoln Street
Denver, Colorado 80295

Approved by: _____
Roger L. Williams
Regional Administrator

Date: Sept 9, 1980

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Northglenn, Colorado

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RECORD OF DECISION

Scope of Decision

This Record of Decision has been prepared in accordance with the regulations of the Council on Environmental Quality (CEQ) and the Environmental Protection Agency (EPA) for implementing the National Environmental Policy Act (NEPA) (40 CFR, Parts 1500-1508, dated November 29, 1978.)

The National Environmental Policy Act requires that Federal agencies consider environmental factors and alternatives in their decision-making process. Section 102(2)(c) of NEPA establishes procedures for preparation of Environmental Impact Statements (EISs) for Federally-funded projects which have the potential to "significantly affect the quality of the human environment". The scope of this record of decision includes all of the information and analysis contained or referenced in the draft EIS, final EIS, public hearing records, and public comment letters related to the Northglenn project.

Background

Northglenn funded Step I and Step II plans without Federal assistance. In September 1977, Northglenn presented copies of their draft facility plan to EPA. The Plan was revised in November 1977 and again in March 1979. The State of Colorado Water Quality Control Division, in March 1978, submitted to EPA certification for Northglenn's funding. In accordance with regulation, EPA cannot award a grant until EPA has approved a facility plan for the proposed project and performed an anlysis of the environmental impacts of the project under the National Environmental Policy Act. EPA issued an environmental appraisal/negative declaration on September 29, 1978 which analyzed the current plan but left unanswered critical questions on the impact to agriculture and public health. Subsequently, Northglenn modified its plan to include purchase of agricultural water rights from the South Platte River following denial by the State Engineer of permits for nontributary deep wells. On June 27, 1980 EPA issued the Final EIS analyzing the environmental impacts of the Northglenn Plan.

ALTERNATIVES INCLUDING THE PROPOSED PLAN

Description of the Northglenn Water Management Plan (Proposed Plan)

The City of Northglenn, Colorado is proposing to construct a multiple-purpose water resource project that consists of a drinking water supply, wastewater collection and treatment system, an urban stormwater runoff collection system and an agricultural reuse program.

Northglenn has entered into a water exchange agreement with The Farmers Reservoir and Irrigaton Company (FRICO) that allows Northglenn to borrow from FRICO up to 7,785 acre-feet per year of water stored in Standley Reservoir for municipal use. Northglenn is committed to return 110 percent of the water borrowed for municipal use to FRICO for agricultural use. Northglenn proposes to construct a year-round storage reservoir in Weld County adjacent to its proposed wastewater treatment facility. Satisfying the payback requires the development of a means of replacing the water borrowed by the City plus 10 percent. This plan for the water payback includes a proposal to collect and treat urban stormwater, plans to acquire sufficient surface and shallow groundwater supplies from the South Platte, and proposals to develop deep nontributary groundwater. Surface water supplies have been acquired through the purchase of agricultural water rights and other water rights intended for developmental purposes.

Presently Northglenn's wastewater is conveyed by the Thornton system and treated at the Denver Metropolitan Sewer District No. 1 (Denver Metro). This service is provided by Thornton through individual contracts with each property owner in Northglenn which will expire in 1988. Consequently, Northglenn has negotiated an agreement with Thornton whereby Northglenn's wastewater treatment will be provided by Northglenn. Northglenn's revised facility plan makes the following recommendations for wastewater transport, treatment, and disposal:

- Collection System - Northglenn will make improvements to the existing collection system which include sealing off several lines and connecting them to a new interceptor.

- Conveyance System - The proposed Northglenn Force Main (46,900 feet) would carry sewage and augmentation water eight miles north of the City to the proposed plant site.

- Wastewater Treatment - The proposal is to construct an aerated, three cell lagoon system for treatment prior to storage and discharge.

- Storage and Disposal - A 4362 acre-foot reservoir (Bull Canal Reservoir) will be constructed in Weld County to provide for winter storage of the effluent. During the irrigation season, FRICO has the right to call for release of water stored in the reservoir. Consequently, the discharge rate will fluctuate based on the calls made for water from the reservoir. Chlorination of the effluent will occur just prior to discharge from the storage reservoir to the Bull Canal irrigation ditch.

- Sludge Disposal - Sludge will be removed and injected in the surrounding agricultural land.

Description of Options Within the Plan

Within the framework of the Plan four options dealing with water supply have been identified by Northglenn and EPA. Each of the first three options assumes that wastewater and urban runoff are conveyed and treated at the Weld County treatment site.

- Option 1 - Northglenn obtains South Platte surface water rights currently used for irrigation.

- Option 2 - Northglenn is awarded 650 acre-feet per year of nontributary groundwater, thereby reducing the amount of South Platte surface water rights needed.

- Option 3 - Northglenn is awarded 2300 acre-feet per year of nontributary groundwater thereby eliminating the need for South Platte surface water rights.

·Option 4 - An alternative to these plans is for Northglenn to acquire its future water supply requirements from FRICO by condemnation or purchase. Wastewater under this system would be conveyed to and treated at the Denver Metro plant with discharge to the South Platte River.

Wastewater Treatment Alternatives

Two wastewater treatment alternatives are identified for Northglenn. The two alternatives consist of: Northglenn's proposed three cell lagoons followed by reservoir storage and discharge to the Bull Canal, and treatment continued at Denver Metro.

Northglenn's proposed wastewater treatment facility has been described previously. Treatment at Denver Metro could be compatible with all water supply alternatives considered with the exception of the FRICO exchange agreement.

At present the wastewater from the City of Northglenn is treated at the Denver Metro Treatment Plant. Expansion of the secondary treatment capacity of the treatment plant is necessary in order to enable the treatment plant to continue to meet its present effluent limitations and treat increased projected flows from the service area. In addition, the Denver Metro discharge permit requires that the treatment plant be upgraded to meet more stringent effluent requirements, including nitrificiation of the effluent. Capital costs of the treatment of Northglenn's flow at the Denver Metro facility were determined to be the difference between the costs of building facilities that are designed to handle the projected design year capacity with and without the design flows from Northglenn. The operation and maintenance costs of the treatment of Northglenn's flows at Denver Metro were determined by the prorated fraction of the total operation and maintenance costs.

If Northglenn were to continue to have its wastewater treated at Denver Metro for the 20-year planning period, the capacity of the existing interceptor system which conveys Northglenn's flow to Denver Metro through Thornton (Northglenn is not a member of Metro) would be exceeded. Costs were also developed for an interceptor and force main system that could accommodate the increased projected flows. This system would serve Northglenn and part of Thornton. The cost of this system that was attributed to Northglenn was a prorated share of the capital and operation and maintenance (O&M) cost based upon Northglenn's flow and the total flow. The cost of these two alternatives for wastewater treatment are presented in Table 1.

Treatment Site Alternatives

EPA conducted an alternative site analysis for a wastewater treatment and storage system, which would be similar to the currently proposed Northglenn facility. EPA recognizes that Northglenn has expended a considerable amount of time and money investigating and designing for Site 10. The site analysis evaluated three additional sites for treatment and storage of Northglenn's wastewater (see Figure 1).

TABLE 1

WASTEWATER TREATMENT

NORTHGLENN TREATMENT AND RETURN TO FRICO

ITEM	Capital Costs	O&M	Salvage
Treatment Lagoons	$ 2,643,100	$ 260,800	$ 439,651
Bull Canal Reservoir	4,354,700	86,000	724,357
Pump Sta. "A"	597,800	32,190	49,719
Force Main	1,729,000	14,430	287,600
Collection System	10,151,100	98,160	510,254
Field Monitoring	57,400	35,100	0
Decono Disinfection	20,000	1,600	0
Tailwater Control	110,200	1,500	Land 72,000
Maintenance Equipment	150,000	0	0
Construction Manager	429,700	0	0
Land & Easements	161,400	0	0
Contingencies	1,082,570	0	180,074
Engineering	2,212,600	0	0
Step 3 Engineering	513,000	0	0
Sub-Total	24,212,600	529,780	2,198,855
EPA Funding	6,948,000	0	0
TOTAL	$ 17,264,600	$ 529,780	$2,198,855

PRESENT WORTH

Capital Less Thornton Pipes		$ 8,273,200
Thornton Pipes		7,991,400
Sub-total		16,264,600
O&M (529,780 x 10.694644)		5,665,808
Salvage Value		<2,198,855>
Total P.W.		19,731,553
Annual Worth		1,844,944 $/yr.
Unit Cost		1.41 $/1000 gal.
4016 AF/Yr. from Northglenn		
Average Household 74x3x365		114 $/yr.

METRO DENVER TREATMENT

Item	Capital	O&M	Salvage
Denver Expansion	$ 662,679	$ 383,389	$ 66,822
So. Platte 15" Interceptor	670,312	21,400	132,973
Henderson Pump Station	866,700		85,966
Henderson Force Main	1,847,376	18,100	366,473
Washington Pump Station	49,819	300	0
Collection (Northglenn)	546,800		71,594
(Thornton)	8,991,900	97,900	713,507
Contingencies	900,777	0	Contained within each item's salvage value
Engineering	501,400	0	0
Debt Service Existing		88,800	
TOTAL	$ 15,037,263	$ 661,099	$ 1,437,335

PRESENT WORTH

Capital Less Thornton Pipes		$ 6,045,863
Thornton Pipes		7,991,400
Sub-total		14,037,763
O&M (661,099 x 10.694644)		7,070,218
Salvage Value		(1,437,335)
Total P.W.		19,690,146
Annual Worth		$ 1,839,300 $/Yr.
Unit Cost		1.41 $/1000 gal.
4016 AF/Yr. from Northglenn		
Average household 74x3x365		114 $/Yr.

FIGURE 1

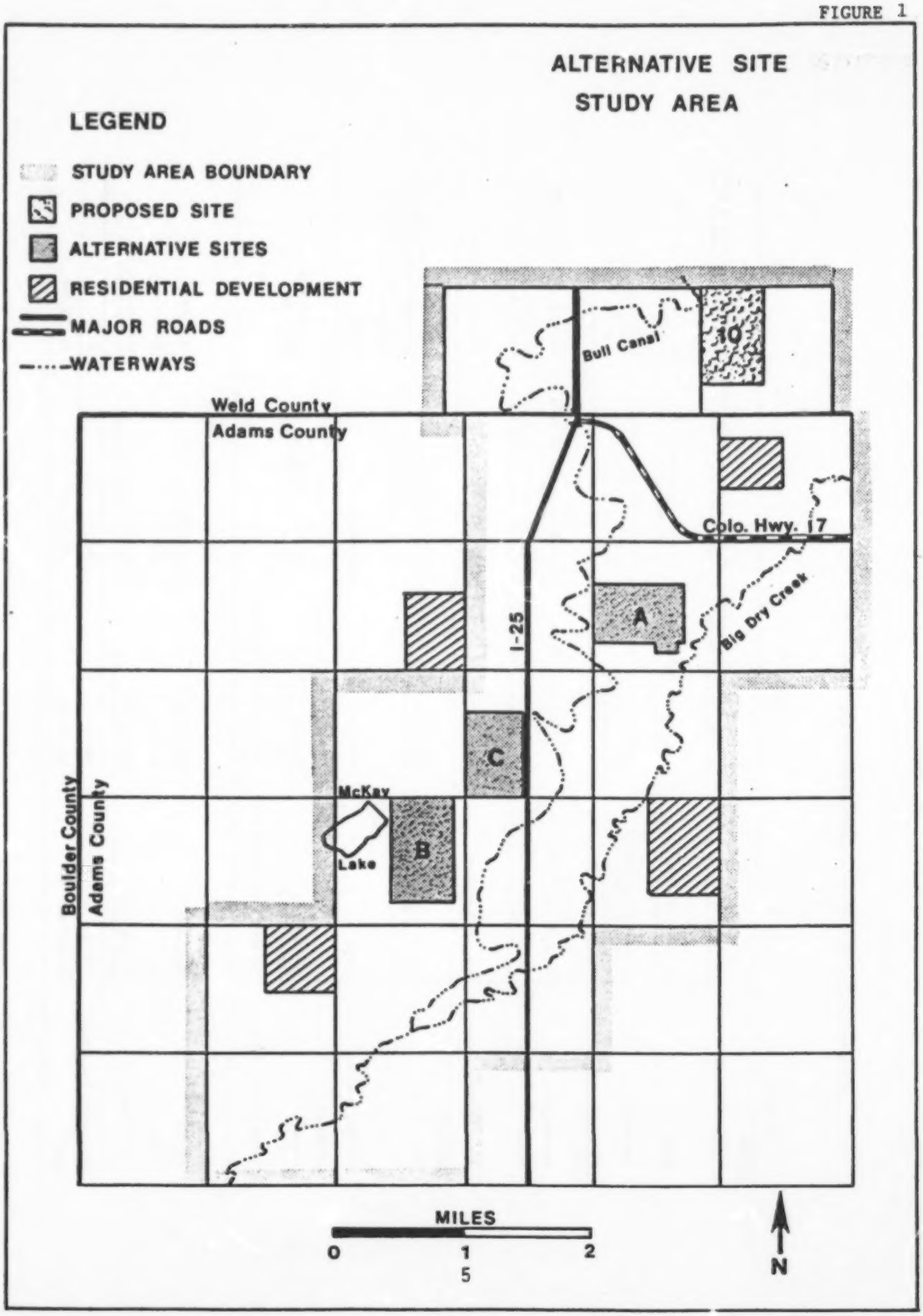
ALTERNATIVE SITE
STUDY AREA
LEGEND
STUDY AREA BOUNDARY
PROPOSED SITE
ALTERNATIVE SITES
RESIDENTIAL DEVELOPMENT
MAJOR ROADS
WATERWAYS
Weld County
Adams County
Bull Canal
10
Colo. Hwy. 17
I-25
A
Big Dry Creek
C
McKay
Lake
B
Boulder County
Adams County
MILES
0
1
2
5
N

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TABLE 2

ENVIRONMENTAL EVALUATION MATRIX OF ALTERNATIVE TREATMENT AND STORAGE SITES

CRITERION	SITE A	SITE B	SITE C	SITE 10
Geology				
Mineral Resources	No sand or gravel resources, possible oil, gas or coal	No sand or gravel resources, possible oil, gas or coal	No sand or gravel resources, possible oil gas or coal	No sand, gravel or recoverable coal resources, possible oil or gas.
Faults	No active or potentially active faults	No active or potentially active faults	No active or potentially active faults	No active or potentially active faults
Subsidence	Probably not of concern: South of Boulder - Weld Coal Field	Probably not of concern South of Boulder - Weld Coal Field	Probably not of concern: South of Boulder - Weld Coal Field	Probably not of concern: South of Boulder - Weld Coal Field
Soils				
Permeability	Low perm., 0.06 - 20 in/hr	Low perm., 0.06- 20 in/hr	Low perm., 0.06 - 20 in/hr	Low perm., 0.06 - 20 in/hr
Suitability for Construction	Med. to low shear strength Mod. to high shrink-swell pot.	Med. to low shear strength Mod. to high shrink-swell pot.	Med. to low shear strength Mod. to severe shrink-swell pot.	Low shear strength, Mod. shrink-swell pot.
Prime Agriculture Land	Yes - if irrigated	Yes - if irrigated	Yes - if irrigated	Yes - if irrigated
Topography				
Slope	East half 3-5% slope to east West half 0-3% slope to east Total elevation change 60 ft.	0-3% slope toward southeast Total elevation change 50 ft.	3-9% slope around two knolls rear center of site; total elevation change 55 ft.	3-5% slope around knoll in southeast corner; 0-3% slope to northwest corner, total elevation change 60 ft.
Flooding Potential	Slight	Moderate	Moderate	Slight
Groundwater				
Depth	Perched: 6-12 ft. Deep: 70 - 300 ft.	Perched: 8-15 ft. Deep: 25 - 120 ft.	Perched: 8-12 ft. Deep: 25 - 70 ft.	Perched: 6-10 ft. Deep: 28 - 30 ft.
Number of Wells Onsite	2(1 municipal, 1 other uses)	2(1 domestic, 1 irrigation and stock)	0	0
Land Use				
Current	Agriculture	Agriculture	Agriculture	Agriculture
Zoning	A-3	A-3	A-3	Agricultural
No. of Residences	None on site; 20-30 within 1/2 mile	None on site; 40 - 80 within 1/2 mile	None on site; 30 - 40 within 1/2 mile	None on site; 20 - 30 within 1/2 mile
Proximity to Bull Canal	200 ft.	900 ft.	300 ft.	50 ft.
Cost 1/	$30,247,900	$30,326,600	$30,110,400	$30,242,300

1/ Does not include costs of delaying project.

The purpose of this analysis was to determine if another site is environmentally preferred or whether Northglenn's proposed treatment site is environmentally acceptable when compared to other sites. Summarized in Table 2 are the conclusions of the alternative site analysis.

Water Supply Alternatives

Municipalities within the Denver Metropolitan Area have several options available for a water supply source. The basic options consist of developing a water resource on the West Slope or East Slope of the continental divide or a combination of both. Water from either the West Slope or East Slope can be obtained by the following means:

- Development of new appropriations
- Acquire existing water rights
- Participation in existing water development projects

West Slope Water

New Appropriations. New appropriations require the creation of new water rights on the West Slope. However, new appropriations in the Colorado River Basin are not expected to be easily obtained and not likely to provide a dependable water supply. Energy development demands are expected to use much of Colorado's share of the water allocated under the Colorado River Compact. Lower basin states are expected to exercise their rights under the Colorado River Compact and Upper Basin Compact. Prior to the year 2000, it is expected that this new demand will curtail the use of direct flow and storage water rights junior to 1970 and may even affect rights junior to 1960.

Participation in Existing Water Projects. Projects for which Northglenn may be eligible for participation in with another municipality include:

- Aurora's Homestake Project
- Colorado Big Thompson Project
- Windy Gap Project

Participation in the City of Aurora's Homestake Project is questionable at this time. The estimated yield from this project ranges from 10,500 acre-feet in an average year to 3,300 acre-feet in a dry year. It is unclear if Aurora has water supplies in excess of its own requirements, and construction is not projected to be completed until 1988.

Existing stipulations prohibit the use of Colorado Big Thompson (CBT) water outside the boundaries of the Northern Colorado Water Conservancy District (NCWCD). Northglenn is outside these boundaries and currently ineligible for CBT water. Northglenn could potentially be annexed into NCWCD. NCWCD is concerned with their ability to meet present water demand projections and past court petitions for water have been defeated on the basis of impairing the rights of present CBT water users. Furthermore, NCWCD's present water supplies have been allocated

to existing users within the district. The extent of Northglenn's privileges with a new subdistrict would only be that of attempting to buy-out existing user's rights.

Windy Gap is a subdistrict of the NCWCD. Water resources to be developed by this subdistrict have been allocated. Upon admission to the subdistrict, Northglenn would have to purchase part of the water allotment from an existing participant. Currently, no excess water is available from any of the existing participants.

East Slope Water

New Appropriations. New appropriations would require new water rights from the South Platte River. Intense competition exists for any further allocation of the South Platte River and its tributaries. It is thought that the allocation of rights on the South Platte have been over extended. A flow of 5,000 cubic feet per second (cfs) in the South Platte River at the Denver gaging station is considered necessary to realistically satisfy the perfected direct flow water rights on the mainstream, even though the decreed water rights fax exceed 5,000 cfs. Flows in excess of 5,000 cfs would represent surplus water available to a new appropriation. Flows in excess of 5,000 cfs were experienced for only ten years during the period 1896 to 1975. If the Narrows Reservoir is constructed and its conditional water right perfected, no surplus water upstream of Narrows would be available. Because of the unreliability of new appropriations in the South Platte River Basin, municipal water supplies would not be feasible and new reservoir storage development would largely be supported by independent water supplies or by existing decrees.

New appropriations of nontributary water from the deep underlying aquifer of the Denver Basin are available. Northglenn has applied for such deep well water rights to supply a portion of their water needs. It now appears such deep well rights will be granted.

Acquiring Existing Water Rights and Deep Wells. As explained in the EIS, Northglenn decided to purchase some South Platte surface water (from Consolidated Ditches among others) to secure sufficient make-up water following initial denial by the State Engineer of their requested deep well permits. Based on recent opinions of the Water Court, it now appears that Northglenn will be permitted some if not all of the deep well water applied for. If so, Northglenn could drill and produce this water, thereby having excess supply for its design year needs.

The South Platte - Deep Well alternative includes combining the deep well source and the South Platte surface source for raw water delivery. Under these circumstances, an exchange with FRICO is no longer essential and a wastewater system of transporting sewage to Denver Metro could be implemented. The South Platte raw water would be treated at the Northglenn water supply treatment facility now under construction. The South Platte water would be diverted in accordance with the priority system and Northglenn would return the historic depletion through Denver Metro supplemented as necessary by release from storage.

Participation in Existing Projects. The existing systems available for Northglenn to pursue as water supply options are: Denver Water Board, Thornton, FRICO exchange, purchase or condemnation.

Denver Water Board (DWB) has indicated in the past that it would be interested in providing Northglenn's water supply, although recent reports indicate current supplies may not meet present water demands beyond 1998. The Denver City Charter prohibits water service outside the City limits if there is not enough water for the inner city water requirements. Presently the DWB has adopted a policy of exercising caution in entering into new contracts for outside service and is limiting the number of annual taps for new service. The DWB has stated that it fully intends to scrutinize any additions to the service areas of its existing raw water customers, and contracts for the distribution of raw water supplies outside the service boudaries will be stopped.

If water service was available from Denver, either raw water service or treated water service could be considered as an available alternative.

Northglenn currently is receiving water from the City of Thornton and could continue. Future service would be subject to Thornton's agreement to provide water and Thornton having sufficient water resources to provide it. Thornton officials have indicated in the past they are capable and willing to provide an adequate quality and quantity of water to Northglenn in the future. However, Thornton's current position is that they have taken steps to sever their systems and believe it is not feasible or appropriate for Thornton to reassess its water resource development plan at this late date. (See May 1, 1980 letter to EPA from Thornton. Appendix A of Final EIS)

Costs of the alternative water supply/wastewater treatment systems are shown in Table 3 and Table 4, and the estimated costs for Northglenn to finance its portion of water supplied by Thornton is shown in Table 5.

NO FEDERAL ACTION ALTERNATIVE

The "No Federal Action" alternative includes a refusal by EPA to make a grant to the City of Northglenn for wastewater treatment. Such a denial by EPA could be based on a finding of ineligibility under the Clean Water Act or significant unavoidable adverse environmental impacts. Northglenn's total water management program is expected to cost $67 million with $6.9 million eligible under EPA regulations. As only 10 percent of the capital costs and none of the annual costs are expected from the federal government, Northglenn has indicated to EPA that they will still proceed with the project in the absence of federal funds. Thus, it is possible that Northglenn will complete the water management program entirely with local funds should EPA deny a grant.

TABLE 3 (8/15/80)

WATER SUPPLY

	Surface Water			Deep Wells & Surface Water			Deep Wells		
	OPTION 1			OPTION 2			OPTION 3		
ITEM	CAPITAL COSTS	O&M	SALVAGE VALUE	CAPITAL COSTS	O&M	SALVAGE VALUE	CAPITAL COSTS	O&M	SALVAGE VALUE
Standley Lake Pipe	1,494,100	20,000	237,114	1,494,100	20,000	237,114	1,494,100	20,000	237,114
Treatment System	4,979,200	418,668	553,139	4,979,200	418,668	553,139	4,979,200	418,668	553,139
Distribution, New & Thornton Pipes	20,338,700	280,986	1,255,237	20,338,700	280,986	1,255,237	20,338,700	280,986	1,255,237
Deep Well & Well #7	140,774	15,000	12,412	629,984	116,171	55,543	2,240,850	127,426	197,569
Maintenance Equip.	200,000	0	0	200,000	0	0	200,000	0	0
Const. Maintenance & Resident Engr.	1,857,300	0	0	1,857,300	0	0	1,857,300	0	0
Land & Easements	180,000	0	85,988	180,000	0	85,988	180,000	0	85,988
Contingencies, 25%	375,000	0	59,513	375,000	0	59,513	375,000	0	59,513
Eng. Legal & Administrative, 15%	1,696,800	0	0	1,696,800	0	0	1,696,800	0	0
Overhead & Admin.	0	299,250	0	0	299,250	0	0	299,250	0
Water Rights Purchase	4,110,120	0	1,087,126	4,110,120	0	1,087,126	4,110,120	0	1,087,126
Subtotal	35,371,994	1,033,904	3,290,531	35,861,004	1,135,075	3,333,660	37,472,080	1,146,330	3,475,686
Replacement Water Costs	9,391,619	55,590	3,054,482	6,512,560	55,590	2,009,431	0	0	0
TOTAL	44,763,613	1,089,494	6,345,013	42,373,564	1,190,665	5,343,091	37,472,080	1,146,330	3,475,686

PRESENT WORTH		PRESENT WORTH		PRESENT WORTH	
Capital Cost Less Thornton Pipes	$27,650,313	Capital Cost Less Thornton Pipes	$25,260,264	Capital Cost Less Thornton Pipes	$20,358,780
Thornton Pipes	14,518,700	Thornton Pipes	14,518,700	Thornton Pipes	14,518,700
O&M	11,651,750	O&M	12,733,738	O&M	12,259,591
Salvage	-6,345,013	Salvage	-5,343,091	Salvage	-3,475,686
Total P.W.	$47,475,750	Total P.W.	$47,169,611	Total P.W.	$43,661,385
Annual P.W. ($/yr)	4,439,208	Annual P.W. ($/yr)	4,410,583	Annual P.W. ($/yr)	4,082,547
Unit Cost (6840 AF/YR)	$1.99/1000 gal.	Unit Cost (6840 AF/YR)	$1.98/1000 gal.	Unit Cost (6840 AF/YR)	$1.83/1000 gal.
Annual Avg. Household Cost (131,400 gal/yr)	$261/yr	Annual Avg. Household Cost (131,400 gal/yr)	$260/yr	Annual Avg. Household Cost (131,400 gal/yr)	$240/yr.

Cost updated from Northglenn Water Management Program Vol. 2 4/20/77 12%/yr.

Assumptions: Capital costs for the Standley Lake transmission main will not change. Operational procedures dictate that a certain size pipe will be required to accomodate the diurnal flow variation when coupled with reservoir facilities; therefore, it is assumed that the transmission main has been designed on these operating constraints.

Water right purchase is for the presently-owned water in Standley Lake:

Total Water Rights Costs 9,261,000
Total Water Rights =
$\frac{9,261,000}{3150}$ = $2940/AF

TABLE 3 (Continued)

WATER SUPPLY

ITEM	FRICO EXCHANGE AGREEMENT OPTION I* CAPITAL COSTS	O&M	SALVAGE VALUE
Standley Lake Pipe	1,494,100	20,000	237,114
Treatment System	4,979,200	418,668	553,139
Distribution, New & Thornton Pipes	20,338,700	280,986	1,256,237
Deep Well & Well #7	140,774	15,000	12,412
Maintenance Equip.	200,000	0	0
Const. Maintenance & Resident Engr.	1,857,300	0	0
Land & Easements	180,000	0	85,988
Contingencies, 25%	375,000	0	59,513
Eng. Legal & Administrative, 15%	1,696,800	0	0
Overhead & Admin.	0	299,250	0
Water Rights Purchase	12,930,129	0	3,420,017
Subtotal	44,191,998	1,033,904	3,290,531
Replacement Water Costs	9,391,619	55,590	3,054,482
TOTAL	53,583,613	1,089,494	6,345,013

ITEM	SOUTH PLATTE-DEEP WELL ALTERNATIVE CAPITAL COSTS	O&M	SALVAGE VALUE	
Standley Lake Pipe	1,494,100	20,000	237,114	
Treatment System	6,979,200	1,319,073	775,319	36%, 20 yr. 64%, 50 yr.
Distribution, New & Thornton Pipes	20,338,700	280,986	1,256,237	
Deep Wells	2,922,860	113,980	257,699	30 yrs.
Raw Water Storage at Treatment Plant	1,800,000	15,000	285,660	
So. Platte Alluvial Wells, Pumps & Trans.	2,389,000	202,315	424,630	18%, 20 yr. 82%, 50 yr.
Maintenance Equip.	200,000	0	0	
Const. Maintenance & Resident Engineering	1,857,300	0	0	
Land & Easements	180,000	0	85,988	
Contingencies	1,740,000	0	276,138	
Eng. Legal & Admin.	2,515,800	0	0	
Overhead & Admin.	0	299,250	0	
Water Rights Purchase	4,110,120	0	1,087,126	
Replacement Water	0	0	0	
TOTAL	46,527,080	2,250,604	4,408,803	

PRESENT WORTH

Capital Cost Less Thornton Pipes	$36,470,313
Thornton Pipe	14,518,700
O&M	11,651,750
Salvage	-6,345,013
Total P.W.	$56,295,750
Annual P.W. ($/yr)	5,263,920
Unit Cost (6840 AF/YR)	$2.36/1000 gal.
Annual Avg. Household Cost (131,400 gal/yr)	$310/yr

PRESENT WORTH

Capital Cost Less Thornton Pipes	$29,413,780
Thornton Pipes	4,408,803
O&M	24,069,409
Salvage	-4,408,803
Total P.W.	$63,593,086
Annual P.W. ($/yr)	5,946,256
Unit Cost (6840 AF/YR)	$2.67/1000 gal.
Annual Avg. Household Cost (131,400 gal/yr)	$351/yr

Cost updated from Northglenn Water Management Program Vol. 2 4/20/77 12%/yr.

Assumptions: Capital costs for the Standley Lake transmission main will not change. Operational procedures dictate that a certain size pipe will be required to accomodate the diurnal flow variation when coupled with reservoir facilities; therefore, it is assumed that the transmission main has been designed on these operating constraints.

Water right purchase is for the presently-owned water in Standley Lake:

Total Water Rights Costs $9,261,000

Total Water Rights = $\frac{9,261,000}{3150}$ = $2940/AF

*Assumes 3,000 AF/YR additional water for flow augmentation required due to adverse water court ruling.

TABLE 4 (8/15/80)

COSTS OF ALTERNATIVE NORTHGLENN WATER SUPPLY/WASTEWATER TREATMENT SYSTEMS

	FRICO WATER SUPPLY				WINDY GAP WATER SUPPLY	
	FRICO Agricultural Reuse (Proposed Project Options)			Denver Metro Wastewater Treatment	Northglenn Wastewater Treatement	Denver Metro Wastewater Treatement
	Option 1	Option 1*	Option 3			
Capital ($)						
Water Supply	44,764,000	53,584,000	37,472,000	56,191,000	61,136,000	61,136,000
Wastewater	24,213,000	24,213,000	24,213,000	15,037,000	24,213,000	15,037,000
Total	68,977,000	77,797,000	61,685,000	71,228,000	85,349,000	76,173,000
Operations & Maintenance ($/yr)						
Water Supply	1,089,000	1,089,000	1,146,000	1,066,000	1,392,000	1,392,000
Wastewater	530,000	530,000	530,000	661,000	530,000	661,000
Total	1,619,000	1,619,000	1,676,000	1,727,000	1,922,000	2,053,000
Present Worth ($)						
Water Supply	47,476,000	56,296,000	43,661,000	55,336,000	66,966,000	66,966,000
Wastewater	26,680,000	26,680,000	26,680,000	19,690,000	26,680,000	19,690,000
Total	74,156,000	82,976,000	70,341,000	75,026,000	93,646,000	86,656,000
Annual Average Household Costs ($/yr)						
Water Supply	261	310	240	305	369	369
Wastewater	155	155	155	114	155	114
Total	416	465	395	419	524	483

*Assumes 3,000 AF/YR additional water for flow augmentation due to adverse water court ruling.

TABLE 4 (8/15/89) (Continued)

COSTS OF ALTERNATIVE NORTHGLENN WATER SUPPLY/WASTEWATER TREATMENT SYSTEMS

	DENVER WATER BOARD WATER SUPPLY				SOUTH PLATTE DEEP WELLS WATER SUPPLY
	Raw Water Contract		Full Service Contract		
	Northglenn Wastewater Treatment	Denver Metro Wastewater Treatement	Northglenn Wastewater Treatment	Denver Metro Wastewater Treatement	Denver Metro Wastewater Treatement
Capital ($)					
Water Supply	51,834,000	51,834,000	54,843,000	54,843,000	46,527,000
Wastewater	24,213,000	15,037,000	24,213,000	15,037,000	15,037,000
Total	76,047,000	66,871,000	79,056,000	69,880,000	61,564,000
Operations & Maintenance ($/yr)					
Water Supply	2,112,000	2,112,000	2,626,000	2,626,000	2,251,000
Wastewater	530,000	661,000	530,000	661,000	661,000
Total	2,642,000	2,773,000	3,156,000	3,287,000	2,912,000
Present Worth ($)					
Water Supply	65,333,000	65,333,000	71,215,000	71,215,000	63,593,000
Wastewater	26,680,000	19,690,000	26,680,000	19,690,000	19,690,000
Total	92,013,000	85,023,000	97,895,000	90,905,000	83,283,000
Annual Average Household Costs ($/yr)					
Water Supply	360	360	392	392	351
Wastewater	155	114	155	114	114
Total	515	474	547	506	465

TABLE 5

COST SUMMARY

THORNTON WATER SUPPLY CONDITIONS

	Condition 1	Condition 2	Condition 3	Condition 4
Total Capital Cost ($)	25,300,000	45,600,000	93,900,000	114,200,000
Operation & Maintenance ($) $280,000 x 10.492 (Present Worth Factor)[3]	2,940,000	2,940,000	2,940,000	2,940,000
Total Present Worth ($)	28,240,000	48,540,000	96,840,000	117,140,000
Annualized Cost ($)	2,690,000	4,630,000	9,230,000	11,160,000
Annual Average Household Cost ($)[4]	182[1]./735[2].	343[1]./896[2].	760	917

1. Existing homes, no tap or connection charges.

2. New homes, tap and connection charges.

3. Present worth of operation and maintenance costs calculated at 7 1/8% for 20 years.

4. Assumes 3.5 people per household.

DISCUSSION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The previous section describes the alternatives to the Northglenn Water Management Program that have been considered and evaluated by EPA. According to recent regulations promulgated by the Council on Environmental Quality, the sponsoring federal agency shall specify in the Record of Decision the alternative or alternatives which are considered to be environmentally preferable. Selection of such alternatives is determined by their impact upon the natural and human environment rather than economic consideration, technical factors or the agency's statutory missions. Of the various combinations of water supply alternatives and wastewater alternatives available to Northglenn, EPA believes that three of these alternative systems are environmentally preferrable over other systems. These include: 1) water supply from Thornton with Denver Metro wastewater treatment, 2) South Platte - Deep Well water supply with Denver Metro wastewater treatment and 3) the proposed FRICO exchange using deep wells for a make up water supply source with agricultural reuse and a treatment plant located at any of the four sites identified in the final EIS. These three alternatives have been selected based upon the following significant environmental factors: agriculturial productivity, water quality in the effected streams, potential health risks, and site impacts.

Agricultural Productivity

The most severe environmental impact of transmountain West Slope diversions from the Colorado River basin has been associated with reduction in the flow of high quality water in the headwaters and the resultant increases in salinity in the lower reaches of the system. Any new appropriation from transmountain diversions of Colorado River water will compound these impacts. If Northglenn were to acquire existing water rights currently diverted on the west slope, the associated impacts could potentially be less in terms of both water quality and agricultural impacts. West slope sources include the Denver Water Board, the Colorado Big Thompson Project and the Windy Gap Project.

The most severe environmental impact of developing East Slope water as a water supply source is a reduction in irrigated agriculture. This impact is most prevalent to agriculture along the South Platte River and areas adjacent to Metropolitan Denver. New appropriation of surface water would have the least effect on agricultural production. However, new surface water is not available in the overly appropriated South Platte system.

The least impact to agricultural productivity of any alternative considered is the FRICO exchange especially when the make up source is obtained from deep wells (Option 3). This is due to the following factors: 1) Option 3 does not require the use of South Platte surface water, 2) all exchange options provide additional water to the FRICO system because of the 10 per cent bonus, 3) condemnation or purchase of the FRICO source would reduce agricultural production in the FRICO system significantly while additional return flow to the South Platte through the Metro treatment plant is unlikely to increase agricultural production along the South Platte where

irrigation water is available in adequate amounts to agricultural appropriators. Option 3 is preferred over the Thornton water supply system since Thornton's water purchases would dry up hay meadows in South Park and like the South Platte - Deep Well alternative, expose the FRICO water to further condemnation action.

Water Quality and Public Health Risks

Water quality changes in the Bull Canal downstream of the proposed reservoir may preclude its potential use for domestic supply and may increase public health risk due to public exposure to treated effluent and uncontrolled reuse of effluent on raw edible crops. Such potential adverse impacts are avoided by selecting an alternative which includes the Denver Metro wastewater treatment alternative. While discharging effluent to the Bull Canal may represent a loss of a possible domestic water sources (it would be possible to deliver Standley Lake water by pipeline) it is the same action which further enhances the liklihood that this water will remain for the purpose of irrigation of agricultural lands.

There is a difference among experts as to the likelihood of the effluent from the facility meeting the suspended solids limit as specified in the permit. EPA's analysis of the feasibility of the proposed system indicates there is substantial likelihood that the proposed process will not limit carbon, thereby not limiting algal growth.

For environmental reasons EPA does not endorse the use of copper sulfate to control algae since there is a chance that concentrations of copper could be released which would be deleterious to crop production. Acceptable operational controls to reduce algal growth are readily available and the environmentally preferred controls include selective discharge (controlling the depth and timing of discharge) and the use of introduced fish to consume algae. This problem would be avoided by selecting the Denver Metro wastewater treatment alternative.

Site Impacts

Three alternative sites, all in Adams County, were identified as having suitable locations, soils, and remoteness from residential communities. While these sites are acceptable environmentally, there is no apparent environmental advantage of selecting any one of the sites. The key issue regarding site selection has concerned possible adverse odor and a possible reduction in property values to nearby residences (within one-half mile). At least 20 houses are within a half-mile radius of each of the sites. Site B has 80 residences within one-half mile. Because of recent developments in the area, it is likely that in the near future residential growth will occur in the vicinity of all sites. Site C is slightly less desirable than the others because one household would have to be relocated. Otherwise, the agricultural use of all four sites makes them equally suitable for the proposed facility. It would be preferable due to possible odor problems to select a site that has very few residences around it; unfortunately, rapid growth of residential housing within the study area has made this impossible. Site problems would be avoided by selecting the Denver Metro wastewater treatment alternative.

EPA DECISION

EPA has decided to approve the Northglenn proposal and offers a grant, with conditions, for approximately $7,615,000. (The final EIS indicated the estimated grant at $6,948,000 based on capital costs, to which has been added the normal estimate for costs of architectural engineering fees, inspection fees and contingencies. The final grant award will be dependent upon the actual construction bids.)

EPA recommends that the City of Northglenn proceed with the construction of the proposed wastewater treatment facility on Site 10 in Weld County. This decision is based on the condition that all mitigation measures and grant conditions contained herein or in the Final EIS (1980) be accepted and undertaken by the City of Northglenn.

If the applicant fails to comply with the mitigation measures contained in the Final EIS (1980) and the conditions set forth in this Record of Decision, EPA may consider any of the following actions:

1. Terminating or annulling the grant
2. Disallowing project costs related to noncompliance
3. Withholding project payments
4. Suspending work
5. Finding the grantee to be nonresponsible or ineligible for future Federal assistance or for approval for future contract awards under EPA grants
6. Seeking an injunction against the grantee
7. Recovery of funds expended
8. Instituting such other administrative or judicial action as may be legally available and appropriate pursuant to EPA regulations 40 CFR 30.920-5

This decision and the conditions are based on the Final EIS record, specifically an analysis of the following factors:

1) the project includes certain benefits to agriculture as compared to other alternatives or the situation if water condemnation litigation had proven successful;

2) the proposal is the most cost-effective water supply and wastewater system (see Table 4);

3) there are no significant direct adverse environmental effects of the proposal other than a potential odor problem at the treatment site and in the canal system;

4) the proposed wastewater system and agricultural reuse system is eligible for a grant providing partial funding as a multiple-purpose project using alternative technology as defined under the Clean Water Act;

5) the State of Colorado has included the project on its fundable project list for Fiscal Year 1979.

6) the Northglenn water rights applications, including change of water rights and the augmentation plan, are a logical approach to preventing injury to other vested water rights. There are a number of legal issues to be resolved by the Water Court and some changes to the water plan as filed are likely;

7) additional public health control measures beyond those originally proposed in the Northglenn facilities plan are required and will be implemented by Northglenn; however the proposal identified in the Draft EIS to prevent the sale of raw edible crops will not be required at this time;

8) assuming the Bull Canal is currently suitable as a domestic raw water source, if the proposal is implemented the Bull Canal downstream of the Bull Canal Reservoir will no longer be suitable as a source of domestic raw water, since treated municipal effluent will on occasion comprise the entire flow in the Bull Canal. EPA concludes that since the Canal is not presently used for a domestic water supply, nor has there been any formal request to designate the Canal for domestic water supply, there is no need to protect the Canal for water supply;

9) selecting one of the environmentally preferred alternatives that includes continued wastewater treatment at Denver Metro ignores the legally binding commitments that have been entered into by Northglenn, FRICO, Thornton, and Westminster. Previous water condemnation actions against FRICO resulted in the agreement among these parties for the water exchange with FRICO. The exchange agreement between Northglenn and FRICO is a function of water supply development which then translates into the need for Northglenn to obtain control of its wastewater in order to satisfy the water exchange agreement. Legal arrangements have been made to execute the exchange independent of federal action.

Further detailed explanation of the analysis of some of these factors follows:

Benefits to Agricultural Productivity

EPA analyzed the Northglenn water exchange plan for possible adverse economic and water quality effects upon agriculture. As originally proposed, the exchange plan included deep wells as the entire source of make-up waters. With development of such a new water source there would not be an adverse effect upon agriculture. The nontributary well permits were denied by the State Engineer and this matter is on appeal by Northglenn in Water Court. Northglenn then purchased South Platte surface water, some of which is currently used for agriculture, so that their plan could be implemented without such deep nontributary wells. Under the latter scheme the extent of agricultural benefits of the proposal was unclear. EPA decided that further study of the possible economic impact upon agriculture was necessary.

The agricultural economic analysis indicates that by utilizing South Platte irrigation water as make-up for the FRICO exchange a decrease in agricultural productivity of up to $370,000 during a year of normal precipitation could occur along the South Platte River. However, this is more than compensated by continued agricultural production in the FRICO system. An estimated value of $1,950,000 in a similar year which productivity could be lost if FRICO water was successfully condemned or purchased outright by Northglenn or another municipality. The proposed Northglenn exchange plan is therefore beneficial to the agricultural community. Further, EPA concludes that properly managed, the benefit of the nutrient values in the sewage effluent will be a net asset which will enhance agriculture production in the area or reduce the costs of maintaining current production levels.

EPA concludes condemnation proceedings against the FRICO water supply would likely be successful. Therefore, EPA supports the proposed exchange as being consistent with EPA policy to protect environmentally significant agricultural lands.

There are also possible adverse impacts to agriculture with respect to the changes in water quality created by the return of treated sewage effluent to the Bull Canal. Possible adverse effects are attributable to increased nitrates in water from the canal include:

- reduction in sugar beet purity
- reduction in barley starch content

Based on comments from knowledgeable affected parties including Great Western Sugar Company and Coors, Inc., EPA concludes that with proper management, such as reduction of nitrogen fertilizer applications and correct scheduling of sewage effluent and Standley Lake releases, such problems are minor and should not affect crop production or value adversely.

Direct Effects of the Proposal

EPA's conclusions as to the nature, extent, and significance of direct adverse impacts are:

- Loss of tax base - The projected loss of $8,500 annually to Weld County and $300 annually to Adams County is a small decrease in net tax revenues to the two counties. No mitigation for this tax loss is recommended. (A proposed draft of an Intergovernmental Agreement offered by Northglenn includes payments in lieu of taxes.)

- Effect on Adjacent Land Values - A decrease in adjacent residential values up to five percent is possible. No change in farmland values is anticipated. No mitigation for such possible reduction in residential property values is recommended.

- Groundwater pollution - The proposed clay liner of the reservoir and lagoon system will minimize any change in groundwater quality. Additional construction measures will be required by EPA and the Corps of Engineers to properly seal well penetrations and/or an inactive fault, if present. No adverse impact upon groundwater is predicted.

- Odor problems - Under "worst case" conditions which include the unlikely combination of minimal atmospheric mixing and malfunction of the aeration system, the Colorado State Standard for odor could potentially be violated. Noticeable increases in odor could result. The probability is judged to be slight, and mitigating measures are incorporated into the plan.

- Reservoir Dam Safety - The design standards meet those recommended by the U.S. Bureau of Reclamation, U.S. Army Corps of Engineers and have been approved by the Colorado State Engineer. No unusual risks are apparent.

- Aesthetics - The storage reservoir embankment will be revegetated and will have a low profile. Therefore, it should not adversely affect the aesthetics of the area.

The Proposal Qualifies for EPA Funding

EPA has proposed alternative methods for funding multiple-purpose projects which involve innovative and alternative technology in order to apply the incentives provided by the 1977 Clean Water Act Amendments. EPA has determined that Northglenn's proposed project is eligible for grant awards as a multi-purpose project using alternative technology. Using the formula of 115 percent of the ratio of the present worth cost of the most cost-effective single-purpose option, to the present worth cost of the multiple-purpose project the eligible fraction of the multiple-purpose project costs are determined. Portions of a multiple-purpose project which involve innovative or alternative technology are eligible for an 85 percent grant rather than the normal 75 percent grant. Agricultural reuse of effluent is defined in the Act as an alternative technology. The total grant amount is therefore determined by multiplying the fraction of the multiple-purpose project costs that are eligible times 85 percent for those items necessary for agricultural reuse and 75 percent for all other wastewater elements.

For EPA to participate in the funding of a multiple-purpose project, the following rules apply. The Northglenn proposal meets these requirements:

1. The cost of the multiple-purpose project must not exceed the sum of the costs of the most cost-effective single-purpose options which accomplish the same purposes. (The Northglenn proposal combines wastewater treatment with agricultural reuse less expensively than two single-purpose projects providing similar functions.)

2. The primary and secondary environmental effects are assessed in accordance with the NEPA review procedures. (As a result of this review under NEPA, EPA concludes that there are no significant net adverse environmental impacts and that net environmental benefits will result from this project.)

3. The pollution control purpose of the proposed project must be necessary to meet an enforceable requirement of the Act. (Additional costs associated with wastewater treatment are necessary for Northglenn during the 20 year planning period to meet enforceable requirements of the Act as defined in Denver Metro's discharge permit. These costs include the need to expand conveyance facilities and to expand and upgrade the Denver Metro Plant.)

4. There is no purchase of existing facilities with federal funds. (Northglenn's purchase of existing water distribution and collection systems has been eliminated from grant eligibility.)

5. The project meets the definition of treatment works, and the works are publicly owned. (The wastewater treatment project will be publicly owned.)

6. The project is consistent with the adopted and approved water quality management plan. (The Northglenn proposal is in compliance with the Denver Regional Council of Governments (DRCOG) Clean Water Plan. Adoption of an Intergovernmental Agreement with Weld County as required by EPA as a prerequisite to final grant payment will mean the project is also in compliance with the Larimer-Weld Council of Governments Clean Water Plan.)

7. The applicant must demonstrate a commitment that effluent will be applied to irrigated productive agricultural land for the design life of the project. (Northglenn has committed to a contingency plan where they will maintain sufficient land in agricultural use to reuse all water generated by the treatment plant throughout the design life of the plant.

Protection of Vested Water Rights

Northglenn must receive approval of the Water Court for a plan of augmentation in order to implement its proposal. In addition, Northglenn has purchased various water rights and intends to transfer such water. This shift in usage of the water in the over appropriated South Platte system must comply with Colorado Water Law and receive approval by the State Water Court.

EPA concludes, based upon expert opinion, that 1) other complex plans with similar principles have been approved by the Water Court and this plan can be administered by the State Engineer; 2) the amount of water obtained from surface sources is reasonable based on historic ditch diversions and stream depletions; 3) the exchange plan will sufficiently protect FRICO shareholders; 4) through the Water Court process, out-of-priority diversions will be properly augmented; 5) the water rights to be used for augmentation are sufficiently senior for that purpose; 6) South Platte water users will be compensated for additional ditch losses; and 7) the Water Court will ensure that South Platte water users will be protected.

In analyzing the water rights and augmentation plans of the Northglenn project, a number of legal issues have been identified by EPA.

These legal issues will be resolved through the judicial process. EPA concludes that some changes to the water plans as filed may thereby be imposed but the probable effect of any such changes during the court process will likely be limited to requirements for additional water for augmenting purposes. Northglenn can acquire such additional water from non-agricultural, agricultural or a mix of sources similar to their present plan.

Need for Additional Public Health Control Measures

Based upon review of the medical literature, and EPA and Colorado policies, EPA concludes that to provide the highest possible degree of protection of public health, the following additional measures not initially proposed by the applicant nor normally incorporated into NPDES permits are necessary:

1. Chlorination of Bull Canal effluent prior to discharge, to assure limitation of the concentration of fecal coliform bacteria to not more than 200 fecal coliform organisms per 100 milliliters (ml).

   A permit criterion of 1000/100 ml has been considered sufficient for agricultural use where some dilution of the effluent would occur. Northglenn has agreed to meet a permit criterion of 200/100 ml for the discharge into Bull Canal. For comparison, the fecal coliform limit in the NPDES permit for the Denver Metro facility is 1000/100 ml. This effluent is at times discharged into the Burlington Ditch.

2. Control of irrigation runoff into the Towns of Frederick and Firestone.

   Present agricultural practices combined with a lack of proper stormwater drainage allows runoff to flow along certain streets of these communities. Northglenn will be required to intercept and control these flows in order to further reduce public contact with tailwater runoff which may consist in whole or in part of treated sewage effluent.

3. Disinfection of Bull Canal water supplied to Dacaono's nonpotable irrigation system.

   The Town of Dacono operates a nonpotable water system used for lawn and garden irrigation. Its source is Bull Canal water which may consist in whole or in part of treated wastewater effluent from the Northglenn facility. In order to minimize the potential for disease transmission in this situation, Northglenn is required to disinfect this source of nonpotable water, or replace its source.

Based upon additional analysis and consultation with the Colorado Department of Health, EPA concludes it will not be necessary at this time to require the prevention of sale of raw edible crops irrigated with effluent from the Northglenn facility. The draft EIS contained the following proposed grant condition:

> In order to receive a grant from EPA, Northglenn will have to agree to a plan to prevent the public sale or distribution of raw edible food crops irrigated with effluent from the Northglenn plant. Northglenn will assist farmers in marketing the crops to buyers who will process the crops or Northglenn will otherwise compensate the farmers for economic losses to the extent of actually purchasing the vegetables if no other satisfactory solution can be found. This condition is necessary in order to minimize the possibility of disease transmission through ingestion of contaminated vegetables. Northglenn will also issue and reissue an advisory that will inform farmers and discourage direct contact with the water and its use on private gardens.

EPA decided not to impose this condition as the analysis indicates the potential for pathogen survival through the system is very low due to reservoir conditions which provide sufficient detention time. Pathogen survival will be further reduced by chlorination of the effluent to meet the limit of fecal coliform bacteria concentration of not more than 200/100 ml. EPA concludes that public health risks under these conditions are not significant and that the public health will be adequately protected. However there is still some unknown albeit small risk that waterborne disease could be transmitted to humans who ingest raw vegetables irrigated with water from the Bull Canal.

At this time, EPA has not developed criteria or guidelines to establish treatment criteria for the use of sewage effluent on raw edible crops. During the next two years the Agency intends to establish national guidelines for effluent criteria for unrestricted agricultural reuse. Upon completion of Agency action in this regard and upon permit renewal, Northglenn will be required to comply with these new guidelines.

If the Northglenn facilty is capable of meeting such new requirements or if it is determined that operational or design changes are necessary and cost-effective to meet these requirements, then compliance will be obtained. In the event that compliance with future Agency guidelines as applied to is not cost-effective for the Northglenn facility, appropriate measures to protect public health will be required.

Regarding the possible irrigation of private gardens, Northglenn will develop an educational plan that will inform farmers of the problem and discourage direct contact with the water and its use on private gardens. In the event that raw edible vegetable crops are irrigated with treated wastewater, EPA recommends farmers locate process markets for the crops.

Protection for Potential Drinking Water Supplies is Not Necessary

The Bull Canal is not currently used for a domestic water supply and there has not been any petition to the State to designate this source for domestic use. Based on very limited data, it does appear the Bull Canal is currently suitable for a domestic raw water supply. The Town of Frederick indicated to EPA they intended to use water from the Bull Canal to augment their present surface supplies.

The Town of Ft. Lupton has informed EPA of its intention to use Sand Hill Reservoir, which may receive some flow from Bull Canal as their future domestic water supply source. Bull Canal discharges to Sand Hill Reservoir are insignificant to the total inflow and, therefore, this proposal should not adversely affect Ft. Lupton's intended use of this source.

The use of treated municipal effluent for a domestic source is not advisable because current treatment technology is unsuitable to treat such a source. In addition, the concentration of nitrates in the Canal would adversely affect such plans since the concentration will exceed the National Drinking Water Standard of 10 mg/l. Water containing such high concentrations of nitrates is not economically suited as a domestic source. EPA recognizes that this change in water quality potentially represents a resource lost. EPA concludes that the Town of Frederick should seek an alternative water supply source.

STEPS TO MINIMIZE ADVERSE EFFECTS

Summary of NPDES Permit Conditions

Effluent discharge requirements of the EPA and the State are enforceable through the National Pollutant Discharge Elimination System (NPDES) permit system, This program requires that an municipality, industry, or other entity discharging into waters of the United States may do so only with an approved discharge permit. The authority for the NPDES permitting system lies with EPA, but in many states, including Colorado, the administration of the system has been delegated to a state agency (in Colorado it is the State Health Department). The NPDES Permit includes appropriate limitations on the quantity, quality, and location of the discharge.

Northglenn has concurred that certain impacts will require mitigation, particularly those associated with changes in quality of the water of Bull Canal. EPA has developed the following mitigating programs for the impacts identified:

1) Potential for disease transmission through direct body contact with Bull Canal water, as a result of farm irrigation practices and public recreation around the Bull Canal.

The NPDES permit effluent limitation is: "The City shall chlorinate the effluent prior to discharge to achieve a criterion such that the geometric mean of fecal coliform bacteria shall not exceed 200 colonies per 100 milliliters on a 30 day basis and shall not exceed a criteria of 400 fecal coliform colonies per 100 milliliters on a seven day basis."

2) The Town of Dacono has a nonpotable water system which draws water from the Bull Canal and is provided without treatment, for irrigation in certain parts of the town. The change in quality of the water in the Bull Canal will unnecessarily cause an increased health risk within Dacono. Northglenn will resolve this problem by either substituting an alternative water source for Dacono's use in place of the Bull Canal water currently used, or installing and operating a system to disinfect the water Dacono receives from the Bull Canal. If disinfection is chosen, the system will be designed to achieve a level of disinfection acceptable to EPA which shall include a residual a chlorine level of not less than 0.3 mg/l.

EPA is negotiating to include the following as a NPDES permit condition and will also require it as a grant condition: "Northglenn will undertake the cost of installations, operation and maintenance of a disinfection system for the Dacono nonpotable water supply, to insure that the nonpotable water supply for the Town of Dacono is properly disinfected to protect public health."

Alternatively, at Northglenn's expense, a suitable replacement for this system could be provided, in which case this permit condition would be withdrawn. Northglenn shall consult with the Town of Dacono to obtain their concurrence with these plans.

3) During irrigation periods, Bull Canal tailwater from lands adjacent to Frederick and Firestone flows through town streets. Northglenn has agreed with EPA to provide necessary facilities to control the tailwater so that it will not enter the Towns of Frederick or Firestone. The plan, which has been conceptually developed, will consist of three ponds that will receive the tailwater from collection ditches as the edge of these fields adjacent to the towns. Low dikes will reduce stormwater inflow into these ponds. Water from the ponds will be recirculated back to the irrigated land. (Should these fields be irrigated during rainfall, some diluted tailwater could flow into the streets.) According to the filings Northglenn has made with the Water Court, their position is that this water is from Standley Lake storage and impounding of this water will not create a water rights problem. EPA concludes that if the Water Court disagrees, this problem would then have to be resolved in Northglenn's augmentation plan.

EPA is negotiating to have the following as an NPDES permit condition and will require it as a grant condition: "Northglenn will provide physical measures to prevent the flow of tailwater from the Bull Canal from adjacent agricultural land into any residential area. Consultation with Frederick and Firestone on the design and location of these facilities is necessary."

Alternatively, at Northglenn's expense, a suitable replacement for this system could be provided, in which case this permit condition would be withdrawn. Northglenn shall consult with the Towns of Frederick and Firestone and the property owners to obtain their concurrence with these plans.

4) Protection of Treatment Capacity

According to EPA's cost-effective regulations, the design life for the Northglenn facility is 20 years. Northglenn is expected to have a population growth rate of 3.1 percent per year resulting in a population estimate of 42,500 people by 2000. The wastewater treatment facility has been designed to accommodate flows for this population. A substantially higher rate of development in Northglenn or expansion of the service area would create the need to expand the facility before the year 2000. Managing growth within these limits reduces the likelihood the city would need to expand the facility within the design period. Measures to protect treatment plant capacity are encouraged by EPA.

Northglenn's ordinances as described in the section under Air Quality, limit the number of new sewer taps on an annual basis and prevent any connections to the proposed interceptor. These ordinances are sufficient to protect treatment plant capacity. In order to ensure Northglenn will continue to abide by these restrictions EPA is negotiating to have the following NPDES permit condition:

> "The City of Northglenn shall maintain an ordinance providing for sewer tap limits as defined by Ordinance Number 529 dated December 21, 1978 or as amended by the City Council. The City shall maintain a prohibition against connections to the Northglenn interceptor for areas outside the current city limits as specified in Section 16-11-5 or as amended to the municipal code."

Summary of EPA Grant Conditions

Under EPA's Construction Grants Program, a grant offer contains a list of requirements to which the grantee must agree to in order to receive the grant. Usually these grant conditions involve certain steps that the grantee must accomplish during the construction phase (e.g. finalization of an operation and maintenance manual, completion of an industrial cost recovery system, etc.). Withholding final grant payment is the usual mechanism that EPA uses to insure compliance with grant conditions. Grant conditions to assure continuous requirements can also be imposed by EPA effective for the design life of the project. The following grant conditions must be met by Northglenn to receive final grant payment:

1) Regarding the possible irrigation of private gardens, Northglenn has agreed to develop an educational plan that will inform farmers of the problem and discourage direct contact with the water and its use on private gardens.

The EPA grant condition is: "Northglenn agrees to issue and reissue an advisory on an annual basis for the design life of the plant, to all shareholders of record in the Standley Lake Division of FRICO, and to all shareholders of record of any other division of FRICO to which waters from the Northglenn reservoir are diverted. This advisory concerns the constituents of the wastewater in the reservoir and a notice that such water should not be used for the irrigation of raw edible vegetable crops."

2) The proposed project will result in delivery of reclaimed effluent and Standley Lake water to FRICO farmers. The reclaimed water is suited for agricultural uses, with the exception of raw edible vegetables. There may be some minor operational changes that can or should be made by the farmers for certain crops. For example, one change that would be advised is the modification of fertilization rates to compensate for nitrogen content in the wastewater applied. The City of Northglenn has agreed to prepare an Agricultural Reuse Manual that will provide information on such matters. This manual will be available to all farmers in the FRICO-Standley Lake Division. Projections regarding water delivery and quality would be updated monthly.

The EPA grant condition is: "Northglenn will develop an Agricultural Reuse Manual to provide advice to farmers of the Standley Lake Division of FRICO on the use of treated sewage effluent for crop irrigation. Periodic public reporting in the advisory notices will be provided to the FRICO Board and to anyone requesting this information."

3) Implementation of the Northglenn agricultural reuse project requires the commitment of large sums of money, both from the City and EPA. Assurance must therefore be given that the City of Northglenn can and will continue the proposed means of wastewater treatment and disposal for the 20 year design life of the project. The proposed plan of agricultural reuse depends on the availability of sufficient agricultural lands to receive the effluent. While EPA concurs with Northglenn that future demand for this effluent should be adequate to insure this, Northglenn will develop a contingency plan whereby sufficient land in agricultural use and under the City's control will be continuously committed

to receive the effluent. This commitment can be in the form of land ownership by the City, irrigation easements, effluent sale for irrigation, or effluent lease for irrigation. The commitment is for a minimum of 20 years beyond the date of the grant award.

The EPA grant condition is: "Northglenn shall assure that sufficient land in agricultural use, approximately 1,100 acres, in the FRICO-Standley Lake system is under their control--through ownership, lease, or contract--for the purposes of effluent disposal. Further, Northglenn will assure that discharge only occurs when there is irrigation use. This condition is binding for the 20-year design life of the project."

4) The northwest corner of the proposed reservoir may contain a fractured zone from a fault trace known to exist in the vicinity. If present, this would provide a zone of permeability potentially allowing communication of the impounded fluid with the groundwater of the immediate area.

Should the fracture pattern be encountered under the dike area or on the reservoir side of the excavation, there are two possible remedies: 1) move the reservoir south of the zone, or 2) design a sealing method. Additional sealing methods could include a combination of a partial membrane seal and compaction of a mixture of the local clays and proper additives to increase the plasticity in order to combine with the fractured zone material.

EPA has required as a condition: "During construction of the cut-off key for the reservoir dike, a trench will be made along the northwest boundary that will penetrate down to a competent zone in the Arapahoe formation. An examination of the exposed units will be made to determine if any fault traces cut across this portion of the reservoir. If a fault trace is located within the proposed reservoir area, either the dam will be relocated to exclude the trace, or the trace will be sealed with an impermeable liner before implacement of the clay liner. The results of these investigations and any mitigative measures must be inspected and approved by the Corps of Engineers, who will report the results to EPA.

All shallow test holes within the reservoir site that have a depth greater than 30 feet below the pond base must be plugged with concrete. Any test holes that have a depth of less than 30 feet must be back filled and compacted. The cased USGS test wells (BW-77-15B and BW-77-17B) must be pressure plugged with concrete from the bottom up to insure proper abandonment. EPA will be notified when the plugging is to take place so that a staff member can observe the plugging operation.

The thickness of the clay liner will be increased over the proposed six inch compacted seal for areas where the seal will be in direct contact with sand or sandstone. Clean claystone material must be used. In all cases the inplace claystone that will be used for a seal must be ripped up to the required depth before compacting to the six inch thick seal. The clay seal will be kept moist to prevent cracking. In areas where claystone is not present, a supply of claystone (from stockpile) must be spread in the area and a compacted seal of at least one foot thick provided."

5) Northglenn has agreed to monitor the agricultural exchange program for the design life of the project. Northglenn will collect data that relates to the potential for surface water quality degradation caused by agricultural tailwater, groundwater contamination from reservoir seepage, agricultural lands or irrigation ditches, and contamination of water and subsequently crops by heavy metals, and pathogenic organisms.

EPA has required the following grant condition: "A monitoring program will be developed to include locations and depths of groundwater monitoring wells, locations of surface water monitoring, and procedures for monitoring crops. Pollutant parameters and monitoring frequencies must be given. Domestic groundwater supplies in the area that could be affected by the project must be identified and periodically monitored. The monitoring program shall be modified as information is developed on items such as the potential for crop contamination by toxic substances.

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(h) of the Clean Water Act. Northglenn will be required to retain all records and information resulting from the monitoring activities required by this permit condition including all records of analyses performed and calibration and maintenance of instrumentation for the design life of the project.

Northglenn must provide annual public reporting on the findings of the monitoring program. Northglenn must also identify any nonconformance with regulations concerning the level of contaminants in crops set by FDA, USDA, State agriculture and health departments and other government agencies. EPA shall pay no more than 50 percent of the federal share of the Step 3 project until the draft field monitoring program is submitted to EPA. EPA shall pay no more than 90 percent of the federal share of the Step 3 project until the field monitoring program is approved by EPA."

EPA will provide the Larimer-Weld 208 and Weld County copies of the draft program for their review. A 90-day review period will be provided. EPA will review the Larimer-Weld 208 and Weld County comments before the monitoring program is approved. Northglenn has submitted to EPA a preliminary program.

6) The City of Northglenn is located within the 208 Areawide Planning jurisdiction of the Denver Regional Council of Governments (DRCOG) and has been designated as a Management Agency under the DRCOG Plan. As such, Northglenn is eligible to receive EPA Section 201 Construction Grants funds. Northglenn will have responsibility for any facility they construct, for issuance of bonds, grant administration, and operation and maintenance of the facility.

In accordance with the approved Larimer-Weld 208 Plan, the continuing planning functions in Weld County are the responsibility of the Larimer-Weld Regional Council of Governments. Weld County has been designated as a Management Agency under the Larimer-Weld 208 Plan for all unincorporated areas of the county. As a Management Agency, Weld

County has vital interest in the planning, operation and management of all wastewater treatment facilities constructed within their boundaries.

The proposed Northglenn wastewater treatment and reuse facility will service only the city limits within Northglenn with an eight mile interceptor through Adams County. The plant, however, will be located in southern Weld County, within the jurisdiction of the Larimer-Weld Regional Council of Governments' 208 Areawide Planning Region. This situation is unique in Colorado and there have not been any precedents established for designation of the Management Agency under these circumstances.

EPA has required the following grant condition: "The City of Northglenn and Weld County shall share responsibilities as Management Agencies under their respective 208 Water Quality Plans. Designation of said responsibilities shall be incorporated into an Intergovernmental Agreement following as a minimum those EPA recommendations as outlined above. EPA shall pay no more than 50 percent of the federal share of the Step 3 project until the draft Intergovernmental Agreement is submitted to EPA. EPA shall pay no more than 90 percent of the federal share of the Step 3 project until the Intergovernmental Agreement is signed by the two parties and approved by EPA and the State."

Previously Required Mitigating Measures

When EPA issued its initial environmental assessment on the Northglenn facility in September, 1978, several measures designed to reduce adverse impacts were identified. All Denver area communities which request EPA sewage funds must comply with EPA provisions as developed in the Denver Overview EIS. (See Final Action on the Denver Regional Environmental Impact Statement for Wastewater Facilities and the Clean Water Program, August, 1978.) For the City of Northglenn these conditions include:

Compliance with the State Air Quality Implementation Plan, including:

a. Limiting sewer taps, and
b. Limiting development to within the urban service area and contiguous to existing development.
c. Conformance with Section 176(c) of the Clean Air Act regarding limitations of federal assistance.

Urban Runoff Controls

Erosion Controls

Water Conservation Efforts

Radiological Emergency Response Plan

Archaeological/Cultural Resources

Analysis of Recreational Potential

With certain limited exceptions, EPA has accepted Northglenn's efforts to fulfill these conditions. The current status of these efforts includes the following:

1) Air Quality

The funding of wastewater treatment and collection facilities that involve the addition of capacity to serve future population growth should be done in a manner encouraging the implementation of measures to reduce the existing air pollution problem.

Northglenn will meet the four requirements specified in the Denver Overview EIS through the following provisions:

a. A resolution adopted by the City Council indicating a willingness to comply with all measures developed in the Denver element of the State Air Quality Implementation Plan.

b. An ordinance limiting the number of taps available on an annual basis.

c. Ordinances prohibiting new taps along the proposed new interceptor.

EPA accepts these actions of the City of Northglenn to be in compliance with agency policy to minimize air quality impacts within the Denver urban area. EPA finds that the Northglenn Plan is in conformance with the Colorado State Implementation Plan (SIP) in accordance with Section 176(c) of the Clean Air Act. Accordingly, EPA has required the following grant condition:

"Northglenn shall execute those items specified in City Resolution Number 78-94 regarding its intention to implement and enforce compliance with the provisions of the Denver element of the State Air Quality Implementation Plan (SIP). Specific measures required under the SIP for local governments including Northglenn include consideration of a local smoking vehicle control ordinance, bicycle and pedestrian facility requirements for local zoning ordinances, and subdivision regulations. Northglenn shall maintain an ordinance providing for sewer tap limits as defined in Ordinance Number 529 adopted December 21, 1978 or as amended. The City shall maintain a prohibition against connections to the Northglenn Interceptor for areas outside the current city limits as specified in Section 16-11-5 or as amended, of the municipal code. The City shall not expand the wastewater treatment facility or construct any new interceptor to transport sewerage to the wastewater treatment facility intended to serve areas outside the current city limits unless they first obtain concurrence from the appropriate metropolitan planning organization designated under Section 134 of Title 23, United States Code, the State Air Quality Control Division and EPA that such actions conform to the State Air Quality Implementation Plan in accordance with Section 176(c) of the Clean Air Act. The Regional Administrator may withhold, condition, or restrict the Step 3 grant in the event that he determines that the provisions of Section 316(b) of the Clean Air Act of 1977 have been met."

2) Urban Runoff Controls

The Denver Regional Council of Governments recommended in the 208 Clean Water Plan that urban runoff pollution be controlled by nonstructural controls such as pollution control ordinances (see Denver Overview Final EIS, Volume 1, page 33). The use of the structural pollution controls to collect and treat urban runoff was believed to be too expensive to justify at this time. Accordingly, EPA determined that prior to granting funds for construction or expansion of the wastewater facilities the general-purpose governments within the proposed service area must show progress, in the form of ordinances adopted or recent efforts taken towards implementing the nonpoint source controls recommended by the Clean Water Plan. Northglenn has met this requirement with respect to urban runoff control by adopting a new ordinance to their municipal code entitled "City Urban Runoff Drainage Ordinance".

EPA accepts this ordinance as written as suitable to meet the requirements of an urban runoff control plan. Accordingly, EPA has required the following grant condition:

> "Northglenn shall maintain for the design life of the project an urban runoff control plan similar to the provision contained in Ordinance No. 531 entitled Urban Runoff Management Plan or as amended."

3) Erosion Control

Northglenn had agreed to implement erosion control measures by passing City Resolution Number 78-102, adopted December 21, 1978. The resolution called for adoption of an erosion control ordinance by June, 1979. Northglenn has not yet implemented this provision. Accordingly, EPA will require the following grant condition: "Northglenn will adopt measures to limit erosion and to control sediment prior to final payment of the grant. Northglenn will prepare and adopt an ordinance specifying erosion controls that follows: Guide for Erosion and Sediment Control in Urbanizing Areas of Colorado: Interim Guidance, prepared by the U.S. Department of Agriculture, Soil Conservation Service, Denver, Colorado, 1977. EPA will not award final payment of the Step 3 grant until the grantee has adopted appropriate ordinances or requirement to implement the erosion and sediment control requirements for new development as included in the DRCOG 208 Clean Water Plan."

4) Water Conservation

EPA regulations for cost-effective analyses specify that adequate consideration be made for reducing wastewater flow (generally called water conservation) for communities over 10,000 population discharging wastewater greater than 70 gallons per capita per day (gpcd).

Northglenn has adopted Ordinance Number 555 which establishes fees and charges for connections to the water and sewer utility system which bases charges on estimated use. The graduated fee schedule establishes additional costs for each 5,000 square feet of irrigated lawn with lower fees established if a resident installs drip irrigation or automatically timed spray irrigation.

In addition, Northglenn is also in the process of adopting a city ordinance to specifically promote water conservation. This recommended ordinance is entitled "Water Conservation and Plumbing Code of 1979."

EPA has imposed a grant condition which states: "Northglenn shall develop a water conservation policy similar to their proposed ordinance entitled "Water Conservation and Plumbing Code of 1979", which encourages further reductions in wastewater flows. Said ordinance with amendments shall be adopted and remain in effect for the design life of the project."

5) Radiological Emergency Response Plan

The City of Northglenn is located just beyond the area known as the Category II area (10 mile radius) of the Rocky Flats Plant. The proposed water supply system, however, includes Standley Lake and Woman Creek which are inside the Category 1 area (5 mile radius). Accordingly, EPA has determined Northglenn must comply with provisions of the Radiological Emergency Response Plan for Rocky Flats.

EPA has applied as a grant condition: "The grantee shall develop a notification procedure consisting of distributing and redistributing annually, a pamphlet notice yet to be developed, approved, and furnished by the State, for notifying existing homeowners within the Category II area as defined by the State Radiological Emergency Response Plan. The grantee shall provide EPA with a copy of the procedures, as adopted prior to receiving a Step 3 grant from EPA, provided the State and the Department of Energy have completed this pamphlet at that time. If and when the pamphlet is formally approved at a later date, Northglenn shall then adopt and maintain for the project design life, those procedures necessary for the City of Northglenn as specified in the Radiological Emergency Response Plan."

6) Archaeological/Historical Resources

The survey of archaeological/historical resources conducted of the proposed interceptor route and reservoir site identified a possible area of interest consisting of a turn-of-the-century dump along the interceptor route. No other significant historical resources were identified. Northglenn discussed the situation with the State Historic Preservation Officer and has agreed to modify the interceptor route to avoid this area. EPA has applied the following grant condition: "If archaeological or cultural artifacts are unearthed, construction will be halted and the State Historic Preservation Officer will be consulted immediately. Accommodations will then be made as necessary for excavation and/or assessment of uncovered archaeological resources."

7) Analysis of Recreational Potential

During the review of the final EIS, EPA was notified that the present planning efforts failed to formally consider potential recreational opportunities of the proposal. While many informal discussions were held regarding recreation at the proposed plant site such as waterfowl observation, trails, etc., a complete review of options for recreation has not yet been accomplished.

Accordingly EPA has required the following grant condition: "Northglenn will submit an analysis of recreational potential of the proposed exchange plan. This analysis shall be accomplished by close coordination with Adams County, the Denver Regional Council of Governments, the Heritage Conservation and Recreation Service and the State of Colorado. Said analysis shall provide opportunity for public involvement and shall be due to EPA prior to 50 percent construction completion."

RESPONSE TO COMMENTS RECEIVED ON THE FINAL EIS

Eleven written comments were received and twelve individuals presented oral statements at the public hearings following the publication of the final EIS on June 27, 1980. Three of the oral statements were duplicated by written comments. Six of the respondents, of which four were consultants to the City of Northglenn, favored the project, with eleven in opposition to all or a portion of the project. Two other respondents asked questions of timing or specific effects. EPA has reviewed all of these comments and offers the following response to the major issues raised.

Agricultural Productivity

The Consolidated Ditches Company engaged W.W. Wheeler and Associates and Charles E. Turner, P.E., presently associated with Colorado State University, to review the impact of the project and alternatives upon agricultural productivity. In Mr. Turner's 25-page report entitled "Analysis of Agricultural Productivity as Used in the Final Northglenn EIS", June 1980, he criticizes the methodology and economic theory of the analysis in the EIS. The basic complaint is that by using 1979 year water use data for FRICO and average year data for the South Platte System, the analysis is inaccurate, since 1979 was wetter than normal. Mr. Turner then provides an alternative method (the Blaney-Criddle Procedure) for determining economic value per unit of water. Use of this method alters the conclusion that the Northglenn proposal provides some benefits to the agricultural community. Turner's analysis indicates that an alternative which relies on continued wastewater treatment at Metro and a return flow to the South Platte is preferable.

Only limited crop yield data was available for FRICO, primarily 1979 data. The EIS analysis used 1979 crop values for both systems. Average year water use data for the South Platte system was also used. Since the FRICO system is water short the estimated average economic productivity for FRICO is not unduly affected by higher precipitation. The water use pattern of FRICO is to use all available supplies to irrigate more land or crops needing additional water. In 1979, FRICO water use was 40 percent higher than in the average year despite the additional rainfall, because the wetter year provided a larger Standley Lake reserve. In the adequately, even overly irrigated, South Platte system, however, where land not water is the factor limiting agricultural productivity, water use from direct flow ditches is less during wetter years. The average year water use is the appropriate data reference for the South Platte system. Therefore, the use of such a data base results in a conservative approach for estimating production value per unit of water.

The Blaney-Criddle procedure is used as a water supply planning tool. The Blaney-Criddle procedure assumes that the crop evapotranspiration rate varies directly with the sum of the products of mean monthly air temperature and monthly percentage of daytime hours. The consumptive use rate of crops determined by this procedure is valid to determine what water supply is necessary for optimal production of a crop. The irrigation requirements of a crop are made up by the consumptive use requirement of the crop as

determined by the Blaney-Criddle procedure after accounting for effective precipitation plus water withdrawn from storage in the soil during the growing season. (See "Irrigation Water Requirements" USDA, SCS, Engineering Division, Technical Release No. 21, September 1970). In a report by Blaney and Criddle it is stated: "Accordingly, the Blaney-Criddle methods assumes that with adequate water available, consumptive use varies directly with monthly mean temperature multiplied by monthly percentage of daytime hours of the year, and with the type of crop grown." (emphasis added) (From Blaney, H.F. and Criddle, W.P, "Report on Irrigation Requirements for West Pakistan", produced for Tipton & Kalmbach, Inc., Denver, April 30, 1957, page 3.)

Hence reliance on Blaney-Criddle as a method of comparing the agricultural productivity of two parcels of land is misplaced unless there is a comparable supply of water for each.

The FRICO irrigation system does not have a full water supply available for crop production and the "potential" evapotranspiration rate determined by the Blaney-Criddle procedure can not be achieved under field conditions since the full moisture supply is not available.

In the South Platte system most of the canals have very senior water rights and are able to provide the optimal requirement for their crops. Under this circumstance the evapotranspiration rates estimated by the Blaney-Criddle procedure are valid and can be achieved under field conditions. EPA believes the 0.67 acre-foot per acre of consumptive use of irrigation water for FRICO as presented in the EIS is realistic, primarily because FRICO does not have a full water supply available to the crops. While the 1.66 acre-foot per acre of consumptive use of irrigation water developed by Turner may be optimal, it is inaccurate since it is based on the assumption that crop water requirements are completely satisfied.

EPA believes the analysis of agricultural productivity as contained in the EIS is reasonable and warrants the conclusion that net agricultural production is greater for the exchange options than for condemnation or purchase of FRICO water supplies with a discharge to the South Platte through Denver Metro. The use of the South Platte - Deep Wells alternative gives an intermediate result (less than Option 3 but greater than Option 2) and also exposes the FRICO water to conversion from agricultural to other uses (see Table 6). Therefore assisting Northglenn in this project is consistent with EPA policy to protect environmentally significant agricultural lands.

Impacts Due to Canal Lining and the Flow Augmetation Plan

Several commentors stated that the EIS failed to fully analyze the agricultural and environmental impact due to canal lining. FRICO intends to line most of the Bull Canal system in order to improve efficiency of water delivery. The final EIS summarized studies undertaken by consultants for FRICO and Northglenn which evaluated canal losses due to seepage. The report by Wright-Water Engineers concluded that seepage loss along Big Dry Creek was too small (five percent) to warrant lining and that due to urbanization such losses may eventually be reversed. Total losses along

TABLE 6

GROSS PRODUCTIVITY OF FRICO AND SOUTH PLATTE

IRRIGATED LANDS AFFECTED BY THE NORTHGLENN PROJECT

(IN MILLION DOLLARS)

Option	Description	FRICO[1]		SOUTH PLATTE[2]		TOTAL GROSS PRODUCTIVITY	
		Average Year	Dry Year	Average Year	Dry Year	Average Year	Dry Year
1	Without deep wells	1.95	1.76	0.16	0.15	2.11	1.91
2	650 acre-feet from non-tributary wells	1.95	1.75	0.33	0.31	2.28	2.06
3	2300 acre-feet from non-tributary wells	1.95	1.74	0.53	0.48	2.48	2.22
4	Water from Standley Lake Wastewater to Metro	1.49	1.04	0.53	0.48	2.02	1.52
	South Platte - Deep Well Alternative	1.90	1.61	0.53	0.48	2.43	2.09

[1] Based on $342/acre-foot of consumptive use of irrigation water. FRICO deliveries given in Table 4 of Final EIS, irrigation efficiency = 65% in average year and 70% in dry year.

[2] Based on $259/acre-foot of consumptive use of irrigation water.

Note: All lands which are removed from irrigated agricultural production are assumed to have a dry-farming productivity of $60/acre.

Sample Calculation - Option 1, Average Year:

FRICO

Farm Headgate Delivery = 6390 A-F
Productivity of Irrigated Land = (6390)(.65)(342)=$1.42 M.
Irrigated acreage = 6390/1.04 = 6144 A.
Non-irrigated acreage = 15,000 - 6144 - 8856 A.
Productivity of Non-irrigated Land = (8856)(60)=$0.53 M.
Total FRICO Productivity = $1.95 M.

SOUTH PLATTE

Productivity of Irrigated Land = (2039.2-1667)(259)=$0.096 M.
Non-irrigated acreage=(1667/2039.2)(1343.4) = 1098 A.
Productivity of Non-irrigated Land = (1098)(60)=$0.067 M.
Total South Platte Productivity = $0.16 M.

TOTAL GROSS PRODUCTIVITY = 1.95 + 0.16 = $2.11 M.

Bull Canal were estimated by Hydro-Triad to be 40 percent of the Standley Lake releases (see page 76 of final EIS). Subtracting the estimated five percent seepage loss along Big Dry means that during an average year changes in flow affected by canal lining could amount to 3500 acre-feet per year (35 percent of average annual release of 10,000 acre-feet). This water is currently lost due to canal bank evapotranspiration and evaporation as well as groundwater recharge.

Several commentors indicated that substantially all this water has historically recharged groundwater which then flows to the South Platte River. If so, stream flow could be reduced by that amount. Relatively small changes in stream flow would not economically impact the direct flow irrigators, since there is sufficient river flow to physically divert and they are sufficiently senior so as to assure priority.

If the water court determined that any quantified water losses due to canal lining must be offset by a flow augmentation plan there could be both an adverse economic impact to agriculture and to the responsible party. If one assumes that 3000 acre-feet must be augmented annually and that the source is other agricultural water, then agricultural production could drop. (Note: In the EIS the agricultural productivity analysis eliminated both the adverse effects of obtaining this water and any benefit in the FRICO system that canal lining provides). It is not clear in the event of such a water court ruling whether FRICO, Northglenn, or another party would be responsible to replace such water. If Northglenn were responsible, then it is possible that capital costs of the system could increase by the cost of such water augmentation. At the present price of water ($3000 per acre-foot in the area) 3000 acre-feet would cost $9 million. The cost of the Northglenn proposal under these circumstances in shown in Tables 3 and 4. It remains EPA's position as presented in the EIS that lining of the Bull Canal by FRICO is a private action unrelated to EPA's or any federal action and the issue will have to be resolved in water court.

Several objectors to Northglenn's flow augmentation plan have opposed the plan on the basis that the exchange will increase historical depletions, i.e. decrease stream flow previously available to other water users. Northglenn's plan includes a claim for 100% depletion credit for its storage rights. These sources may have had some historical return flow to the South Platte system. In view of EPA policies to protect agricultural land, EPA considered and rejected the following grant conditions:

"Northglenn shall revise its flow augmentation plan so that there will not be an increase in historical stream depletions except if such depletion is due to canal lining".

Such an admittedly ambiguous condition would be meant to force Northglenn to revise its augmentation plan to met the environmental and social objectives of further protecting farmlands and maintaining historical stream flow. If implemented the condition would be intended to prevent Northglenn from obtaining 100% depletion credit on its purchase of Standley Lake (FRICO shares) storage water and its claims to 300 acre-feet per year of sewer line infiltration. Stream depletion due to canal lining would be exempt since it is generally recognized that a farmer's ability to line canals without augmentation is desirable in order to provide an incentive to improve irrigation efficiency. Of course the legal contraints on water transfers in Colorado are based upon a century of property rights experience and not based upon such factors that may be considered to be in the best interests of the public. Transfers of water are usually approved through private bargaining for such property rights amoung those affected parties. Public scrutiny of the effect is provided by the State Engineer's office and subject to water court procedures. Some prior appropriation states have recently revised their water law to avoid some of these abuses and ambiguities and have therefore limited water transfers to those deemed to be in the public interest.

EPA decided not to apply this grant condition because it would interfere with Northglenn's rights under Colorado water law. Anyway the agricultural productivity of the proposed plan has been determined to be beneficial and therefore sufficient to be compatible with EPA policy to protect agricultural land without such a grant condition. Nevertheless EPA encourages Northglenn to resolve the objections to their flow augmentation plan as expediously as possible.

EPA also received several requests to delay grant award until such time as the Northglenn Flow Agumentation Plan has been approved by the water court. Some of these objections were based on the concept that failure to obtain water court approval of the plan as submitted could even mean federal funds would be wasted on an unuseable system. Based upon expert opinion provided to EPA, the more likely situation is that water court approval may change but not negate the exchange plan. EPA believes it is generally unnecessary to delay any grant until all pending litigation is resolved. At this point all EPA grant requirements have been satisfied. The grant award is limited to eligible portions of the proposed wastewater treatment and reuse system. If for any reason Northglenn does not construct and operate this system in accordance with the facilities plan EPA could terminate and anull the grant seeking recovery of funds expended and other such adminstrative or judicial actions as may be legally available persuant to EPA regulation 40CFR30.920-5.

Tailwater Control

Several objectors to the plan indicated that the EPA requirements to require tailwater control created additional problems. It was stated that elected officials are not likely to approve or allow construction of the tailwater control structures due to community opposition to the entire

project and a belief that stored wastewater creates a public nuisance such as fostering mosquitoes. It is EPA's intention in placing this requirement upon Northglenn to reduce the unnecessary public contact with treated effluent which might result from tailwater runoff into residential areas. If the community and land owners continue to oppose the use of the land in this manner, Northglenn may need to use eminent domain to acquire this property in order to comply with the grant condition. Alternatively, if future residential growth or the ongoing condemnation action against the water right owner is completed, then the grant condition will be met by not irrigating these areas. The tailwater ponds will not create new mosquito breeding habitat since the water will be pumped automatically until all water is consumed by the crop or infiltrates the soil.

Intergovernmental Agreement with Weld County

In response to EPA, the Commissioners of Weld County indicate they are reluctant to enter any agreement to enforce grant conditions. Weld County has misinterpreted EPA's requirement for Northglenn to negotiate an Intergovernmental Agreement (IGA) with Weld County. Although EPA recommends that the IGA contain many of the same measures contained as EPA grant conditions, the purpose is not for Weld County to enforce EPA requirements. Rather if Weld County concurs that such measures or other measures are necessary and desirable for the citizens of Weld County, they can mutually agree with Northglenn to monitor compliance and be reimbursed by Northglenn for their expenses. EPA is prepared to enforce required grant conditions as specified in the section on "EPA's Decision" in this Record of Decision.

Compensation for Reduction in Residential Property Value

EPA has received several requests that EPA should require Northglenn to pay property owners the difference in appraised real estate value. The facility has been designed and should be operated in accordance with applicable state and federal regulations. There is the possibility as analyzed in the Final EIS, that an odor nuisance could occur if the plant is operated improperly. The course of action for these property owners may be through the courts in order to quantify any losses.

Analysis of Recreational Potential

The Denver Regional Council of Governments suggested to EPA that a formal review of recreational opportunities should have been included in the EIS analysis. EPA concurs and notes that while Northglenn officials have informally discussed such opportunities including water fowl habitat enhancement, a trail around the proposed reservoir and many other recreational facilities, none of the suggestions are planned. The DRCOG 1977 report entitled "Regional Parks, Recreation and Open Space Plan" shows a planned bike path between Barr Lake and Boulder which parallels the last mile of the proposed interceptor. EPA suggests that this opportunity as well as options for other bike routes, for tours of the facility, public use of the facility site, and other recreational facilities be evaluted by Northglenn. EPA has therefore added a grant condition that requires Northglenn to prepare an analysis of recreational potential prior to 50 percent grant payment. (See list of grant conditions in the preceding section.)

Compliance with Provisions of the Clean Air Act

The Denver Regional Council of Governments in comments to EPA indicated that they concur with EPA's finding that the project is consistent with the State Air Quality Implementation Plan (SIP). However, DRCOG indicated that there are specific measures required under the SIP for local governments to consider and that Northglenn has not yet considered these issues. These measures include consideration of a local smoking vehicle control ordinance and bicycle and pedestrian facilities for new residential development. These requirements have been added to EPA's grant conditions regarding compliance with the SIP.

Cost Analysis for the South Platte - Deep Well Alternative

The analysis in the final EIS of the South Platte - Deep Well alternative did not include a detailed analysis of the cost of the additional well fields, pipelines, storage and treatment facilities which would be necessary to implement this alternative. A detailed estimated cost of this alternative is shown in Table 3 along with the other alternatives considered. In addition to the water supply facilities proposed under Option 3 which include the water treatment plant, (the Standley Lake pipeline is still necessary under this option in order to deliver Northglenn-owned water) and the purchase of the existing water distribution system from Thornton, the following items are also necessary:

Item	Estimated Capital Cost
1. South Platte well field, pumps, transmission line to treatment plant.	$2,384,000
2. Raw water storage reservoir near treatment plant (1000 acre/feet).	1,800,000
3. Additions to treatment plant for water softening.*	2,000,000
4. Additions to the Deep Well field.	542,000
5. Engineering contingencies legal and administration at 40%.	2,324,000
Total	$9,055,000

* Due to the high dissolved solids content of the shallow well water, water softening equipment would be necessary. The average total dissolved solids (TDS) of the alluvial shallow wells is 800 to 1000 mg/l and TDS of the deep wells would be 100-200 mg/l. When blended, the TDS would exceed the 500 mg/l the recommended limit under the Safe Drinking Water Standard. Therefore precipitation of solids and hardness is necessary.

As proposed by Consolidated Ditches, this alternative would also require Northglenn to provide FRICO 500 acre/feet annually in order to meet the minimum return flow called for in the FRICO-Northglenn Exchange Agreement. If necessary, this item would be common to any alternative which relied upon the Denver Metro wastewater treatment alternative. For consistency, the cost of this item, estimated at $1,580,000 is not included here since it was not included in the cost of the other Denver Metro alternatives.

The capital cost of this water supply alternative when combined with the less costly Denver Metro Wastewater treatment system is less than the proposed exchange plan. When the higher operation and maintenance costs, are included, this alternative is 12 percent higher based on present worth cost than the proposed exchange plan under Option I. Therefore, the results and analyses stated in the EIS regarding the cost selection of alternatives are not changed.

An estimate of agricultural productivity of this option has also been made (see Table 6). The results indicate that the estimated total productivity of $2.43 million under the South Platte-Deep Well option during an average year is slightly less than Option 3 and greater than other options. Hence the conclusions reached in the EIS that Option 3 has the highest agricultural productivity remains the same.